Comments on the Proposed Plan for the 200-UW-1 Operable Unit and its Underlying Focused Feasibility Study

Richard I Smith, P.E

This review encompasses both the proposed plan (PP) and its supporting focused feasibility study (FFS) for the remediation of soil waste sites located within the 200-UW-1 operable unit, which were issued on April 29, 2005. First of all, I commend the authors of the proposed plan on the quality of the organization and presentation of the contained material. The sidebars, while sometimes a little redundant with the text, are very helpful in providing appropriate definitions and other pertinent information when that information is needed by the reader. The basic information related to the proposed plan is presented in summary form in the first six pages, including a characterization of the problem (Table 1), identification of the considered alternatives, a summary of the preferred alternatives for the various waste sites and the estimated costs for each group (Table 2), and a visual illustration of where each alternative is proposed to be applied within the U Plant area (Figure 2). The more detailed information presented later in the document is also well organized and presented in a manner generally conducive to easy understanding of the contents. That said, there is one useful element missing from the document: there is no listing of figures and tables in the Table of Contents. Further comments on some of the information (or lack thereof) presented in the two documents, are given below.

Use of Present-Value Cost Estimates – While I recognize that OMB Circular A-94 directs government agencies to employ present-value analysis in making benefit-cost analyses for projects, the application of present-value analyses to life-cycle cost estimates for competing remediation proposals grossly distorts the true life-cycle cost of projects that extend over many years, e.g., those alternatives that require long-term monitoring and periodic restoration. In those cases, the delayed costs essentially disappear from the total life-cycle cost due to the discounting of those deferred costs. For an honest comparison of two alternatives, one that is completed in a few years versus one that requires ongoing costs for perhaps hundreds of years, both the discounted and the undiscounted life-cycle costs should be presented when considering the cost viability of the alternatives. Table 1 of the PP displays only the present value cost summed over each of the preferred remediation alternatives, without also presenting the analogous summed undiscounted costs. Tables 6 through 10 of the PP display the undiscounted capital and operation and maintenance costs, but these costs are not summed to show the total life-cycle cost, and are not clearly identified as undiscounted costs. The same situation occurs in Table A-1 of Appendix A. To make a direct comparison of the total life-cycle costs between two remediation alternatives, the reader is forced to add the capital and operation and maintenance costs for each alternative. Thus, another line should be inserted into each cost portion of each of the grouping shown in Tables 6 through 10 and Table A-1 and clearly identified to show the total undiscounted life-cycle cost for each alternative, directly above or below the discounted present value cost number. Similarly, additional clearly identified entries should be made into Table 1 to display the summed undiscounted life-cycle costs for each of the grouping in the table. The cost tables in the FFS should be similarly improved.

Viability of Proposed Alternative Scenarios – One of the items missing from the original FFS and PP, when issued last year, was any quantitative analysis of costs and doses associated with excavation and removal of contaminants from the soil waste sites. Such an analysis is included in the recently issued documents, for the case of excavation to a depth of about 200 feet below the existing surface. While this analysis is useful in quantitatively demonstrating the cost and difficulty of such an undertaking, it also demonstrates that no one in their right mind would consider deep excavation to be a viable scenario for the Remove, Treat, and Dispose alternative. Thus, some intermediate (hybrids of RTD and Capping) approaches should be considered for the RTD alternative, in addition to the extreme excavation case.

The various displays in Chapter 2 and in Appendix D of the FFS which show contamination concentrations as a function of depth below the ground surface clearly illustrate that the bulk of contaminant activity lies in the 30 to 50 foot range beneath the surface. Thus, the scenario that <u>should</u> be evaluated, with the same level of detail, is one in which the excavation is limited to about 50 feet below the surface. At that level, the bulk of the contaminant activity would have been removed, leaving just the contaminants in the deeper vadose zone. Removal of the near-surface contaminants would eliminate the problem of potential surface dose to industrial workers and to intruders. I suspect that if STOMP calculations were run with the near-surface contaminant region removed and backfilled with ordinary soils, the results would show that the peak magnitudes of the long-lived contaminants such as ^{99}Tc and U_{metal} appearing in the groundwater after long time durations would essentially disappear, since the bulk of the source term would have been removed, with the result that little long-term monitoring after closure would be needed. If the calculation shows that additional groundwater protection is still needed, then a calculation should be made with the upper 8 feet or so of the backfill replaced by an ET cap that is set into the ground, protruding only a foot or so above the surrounding terrain. The application of a mostly sub-surface cap would make good sense in this case because the excavation is already there and needs to be filled anyway.

Assuming that the suggested hybrid RTD scenarios produce reasonable results from a cost/dose/groundwater perspective, then the detailed evaluations in Appendix C of the PP would need to be revisited and reevaluated in selecting the preferred alternatives for remediation.

Presumption of Future Remedial Actions – Some of the proposed remedial actions are based on the presumption that the 221-U building will be placed under a huge cap, and that all five waste sites presently proposed for capping will indeed be capped. If the 221-U cap were not deployed, the 216-U-4 Reverse Well and the 216-U-4A French Drain will have to be remediated, probably via some RTD approach. Similarly, the capping assumption for the 216-U-1, U-2, U-8, and the 241-U-361 settling tank has precluded any consideration of RTD approaches for those units. These units are where the partial excavation, backfill and/or mostly sub-surface cap approach, described previously, would be most useful. In the case of the U-1 & 2, and the 241-U-361 remediation, the excavation for removal of contaminants from U-1 & 2 would make excavation and removal of the 241-U-361 tank the logical choice. In addition, these excavations would remove the overlying contamination from UPR-200-W-19 at the same time eliminating that near-surface hazard.

In any event, there should be development and evaluation of reasonable hybrid RTD scenarios to deal with these sites if caps were not deployed, because the deep excavation scenarios are unreasonable. Analysis and evaluation of the more reasonable hybrid RTD scenarios should be done, because comparing the unreasonable deep excavation RTD scenarios to surface capping scenarios unfairly biases the conclusions in favor of capping.

Groundwater Contaminant Concentrations – Because protection of the groundwater is the principal purpose of the proposed remedial actions, it is important to understand the information presented related to groundwater contaminant levels arising from proposed remedial actions. Figures D-7 through D-12 of Appendix D in the FFS present the curves of groundwater contaminant concentration as a function of time following remediation. Unfortunately, the figures do not include horizontal lines that would indicate the maximum concentration limits (MCL) for each contaminant shown in the figures. The reader cannot readily determine whether or not a given contaminant exceeds its MCL anytime within the period of the calculation (10,000 years). Thus, the MCL lines should be added to the figures, and somewhere there should be presented a table of the approved MCLs for the contaminants of concern. After a difficult search, I found a set of MCLs for ^{99}Tc, Uranium metal, and Nitrogen (nitrates and nitrites) hidden in Table 5 of the PP.

Fate and Transport Modeling – The STOMP calculations using values of K_d for uranium metal (0.6 and 3) illustrate the strong sensitivity of the results for transmittal into the groundwater to the assumed values of K_d. The discussion of contaminant soil interaction characteristics (Section D3.3 of the FFS) suggests that values of 0.6 or 0.8 yield rather conservative results, and without further input of acidic liquids, the uranium downward migration might be less than predicted. It would be very interesting to see an additional set of STOMP calculations for at least one crib system where the K_d for uranium metal was varied from 0.6 to 3 in enough steps to better define the sensitivity of the transmittal results to that parameter.

As mentioned earlier, the STOMP calculations should be repeated for cases where the contaminants are removed down to 50 beneath the soil surface and the excavation backfilled with either normal site soils or with the upper 8 feet of the backfill comprised of an ET cap.

Miscellaneous Comments – The following are some minor nits discovered during the review process.

The figures in Appendix C of the FFS which display numbers in exponential format on the y-axis all show the bottom line as 0.00E+1. These values are incorrect and misleading in all cases. For example, in Figure C-3 (both displays), the vertical scale is given in units that are multiples of 0.5E-4. Thus, the proper display for the bottom line (which is intended to be a zero value) should be 0.00E-4 for consistency with the rest of the display. While zero is zero, no matter how it is displayed, these figures would look better if the bottom line of zero was labeled with a value format consistent with the rest of the figure.

The caption on Table 9 of the PP has a misspelled word: RESERVE should be REVERSE.